TRANSLATION JP 10-265773 A

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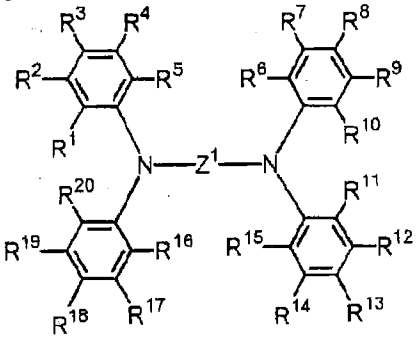
CLAIM + DETAILED DESCRIPTION

[Claim(s)]

[Claim 1]Electron hole pouring material for organic electroluminescence elements shown by the following general formula [1].

A general formula [1]

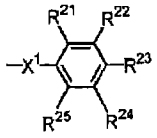
[Chemical formula 1]



Independently R^1 - R^{20} among [type, respectively A hydrogen atom, a halogen atom, An alkoxy group which is not replaced [an alkyl group which is not replaced / substitution or /, substitution or], A CHIOARUKOKISHI machine which is not replaced [substitution or] and mono-**** express a condensed multi-ring machine which is not replaced [a monocycle machine which is not replaced / a JI substitution amino group, substitution, or /, substitution, or] and a basis shown by the following general formula [2], however at least one of R^1 - the R^{20} is a substituent shown by a general formula [2]. An arylamine ring which is not replaced [a cycloalkyl ring which is not replaced / substitution or /, substitution, or] may be formed by the substituents which R^1-R^5, R^6-R^{10}, R^{11}-R^{15} or R^{16} - R^{20} adjoin.

General formula [2]

[Chemical formula 2]



the inside of a formula, R^{21} - R^{25} -- respectively -- independent -- a hydrogen atom and a halogen atom. The CHIOARUKOKISHI machine which is not replaced [the alkoxy group which is not replaced / the alkyl group which is not replaced / substitution or /, substitution, or /, substitution, or] and mono-**** express the condensed multi-ring machine which is not replaced [the monocycle machine which is not replaced / a JI substitution amino group, substitution, or /, substitution, or]. R^{21} - R^{26} are adjoining substituents, and may form the arylamine ring which is not replaced [the cycloalkyl ring which is not replaced / substitution or /, substitution, or]. X^1 The alkylene machine which is not replaced [direct combination, substitution, or], -[$CR^{26}(R^{27})$] x-O-[$CR^{28}(R^{29})$] y-, - [-- CR -- $^{--30--}(R^{31})$ --] -- x-S - [-- CR -- $^{--32--}(R^{33})$ --] -- y - - O - - S - > -- C=O -- > -- SO -- $_{--\text{two}--}$ -- > -- SiR -- $^{--}$ -- $^{--34--}(R^{35})$ - > -- NR -- $^{--36--}$ - > -- PR -- $^{--37--}$ - > -- P=O (R^{38}) -- expressing . R^{26} - R^{39} express the condensed multi-ring machine which is not replaced [the monocycle machine which is not replaced / the alkyl group which is not replaced / substitution or /, substitution, or /, substitution, or]. Although x and y express the integer of 0-8, respectively, neither x nor y is set to 0.

Z^1 expresses the substituent shown by the following general formula [3], the following general formula [4], or the following general formula [5].

General formula [3]

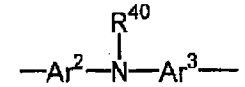
[Chemical formula 3]

—Ar^1—

(Ar^1 expresses the Ally Wren machine which is not replaced [substitution or].)

General formula [4]

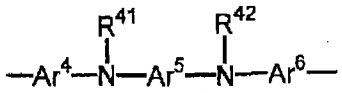
[Chemical formula 4]



(Ar^2 or Ar^3 expresses the Ally Wren machine which is not replaced [substitution or].) R^{40} expresses the condensed multi-ring machine which is not replaced [the monocycle machine which is not replaced / the alkyl group which is not replaced / substitution or /, substitution, or /, substitution, or].

General formula [5]

[Chemical formula 5]



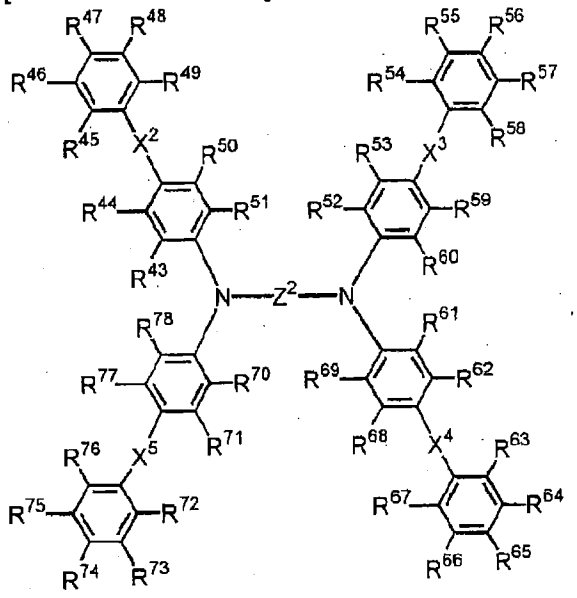
(Ar^4 - Ar^6 express the Ally Wren machine which is not replaced [substitution or].) R^{41} or R^{42} expresses the condensed multi-ring machine which is not replaced [the monocycle machine which is not replaced / the alkyl group which is not replaced / substitution or /, substitution, or /, substitution, or].]

[Claim 2]in a general formula [1] -- R^1-R^5, R^6-R^{10}, R^{11}-R^{15}, and R^1 The electron hole pouring material for organic electroluminescence elements according to claim 1 in which each at least one of 6 - the R^{20} is a substituent shown by a general formula [2].

[Claim 3]The electron hole pouring material for organic electroluminescence elements according to claim 1 or 2 shown by the following general formula [6].

A general formula [6]

[Chemical formula 6]



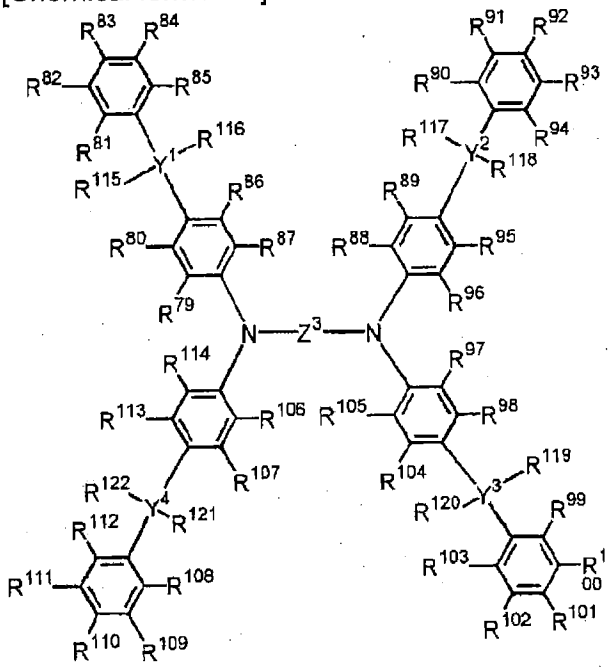
Independently R^{43} - R^{78} among [type, respectively A hydrogen atom, a halogen atom, A CHIOARUKOKISHI machine which is not replaced [an alkoxy group which is not replaced / an alkyl group which is not replaced / substitution or /, substitution, or /, substitution, or] and mono-**** express a condensed multi-ring machine which is not replaced [a monocycle machine which is not replaced / a JI substitution amino group, substitution, or /, substitution, or]. R^{43}, R^{44}, R^{45}-R^{49} and R^{50}, and R^{51}, R^{52}, R^{53}, R^{54}-R^{58} and R^{59}, and R^{60}, . [the substituents which R^{61}, R^{62}, R^{63}-R^{67} and R^{68}, R^{69} and R^{70}, R^{71}, R^{72}-R^{76} and R^{77}, and R^{78} adjoin] An arylamine ring which is not replaced [a cycloalkyl ring which is not replaced /

substitution or /, substitution, or] may be formed. Z^2 expresses the same meaning as above-mentioned Z^1.]

[Claim 4]Claim 1 shown by the following general formula [7] thru/or electron hole pouring material for organic electroluminescence elements of any of Claim 3, or a description.

A general formula [7]

[Chemical formula 7]



R^{79} - R^{114} among [type An alkyl group which is not replaced [a hydrogen atom, a halogen atom, substitution, or], A CHIOARUKOKISHI machine which is not replaced [an alkoxy group which is not replaced / substitution or /, substitution, or] and mono-**** express a condensed multi-ring machine which is not replaced [a monocycle machine which is not replaced / a JI substitution amino group, substitution, or /, substitution, or]. R^{79}, R^{80}, R^{81}-R^{85} and R^{86}, and R^{87}, R^{88}, R^{89}, R^{90}-R^{94} and R^{95}, and R^{96}, R^{97}, R^{98}, R^{99}-R^{103} and R^{104}, R^{105} and R^{196}, R^{107}, R^{108}-R^{112} and R^{113}, and R^{1}. [the substituents which 14 adjoins] An arylamine ring which is not replaced [a cycloalkyl ring which is not replaced / substitution or /, substitution, or] may be formed. R^{115} - R^{122} may express a condensed multi-ring machine which is not replaced [a monocycle machine which is not replaced / an alkyl group which is not replaced / a hydrogen atom, substitution, or /, substitution, or /, substitution, or], and may form a cycloalkyl ring by the adjoining substituents. Y^1 - Y^4 express a carbon atom or a silicon atom. Z^3 expresses the same meaning as above-mentioned Z^1.]

[Claim 5]inter-electrode [a pair of] -- much more -- or in an organic electroluminescence

element provided with a luminous layer which consists of an organic compound thin film of two or more layers, An organic electroluminescence element, wherein at least one layer is a layer containing Claim 1 or electron hole pouring material for organic electroluminescence elements of any of Claim 4, or a description.

[Claim 6]In an organic electroluminescence element provided with a luminous layer which becomes inter-electrode [a pair of] from an organic compound thin film of two or more layers, An organic electroluminescence element, wherein at least one layer between an anode and a luminous layer is a layer containing Claim 1 or electron hole pouring material for organic electroluminescence elements of any of Claim 4, or a description.

[Claim 7]In an organic electroluminescence element which consists of an organic compound thin film of two or more layers which contains a luminous layer in inter-electrode [a pair of], An organic electroluminescence element, wherein a hole injection layer which is provided with a hole injection layer of at least two layers between an anode and a luminous layer, and touches an anode is a layer containing Claim 1 or electron hole pouring material for organic electroluminescence elements of any of Claim 4, or a description.

[Claim 8]In an organic electroluminescence element provided with a luminous layer which becomes inter-electrode [a pair of] from an organic compound thin film of two or more layers, An organic electroluminescence element, wherein at least one layer of a luminous layer is a layer containing Claim 1 or electron hole pouring material for organic electroluminescence elements of any of Claim 4, or a description.

[Detailed Description of the Invention]

[0001]

[Industrial Application]This invention can be used about organic electroluminescence (EL) element material as an element material for organic EL devices used for the source of flat light, or display apparatus.

[0002]

[Description of the Prior Art]An organic photoconducting material has many advantages, such as possibility of various molecule modifications, and nonpolluting, and many compounds are proposed. For example, an oxadiazole derivative (US,3,189,447,B), an OKISAZORU derivative (US,3,257,203,B) and a hydrazone derivative (US,3,717,462,B.) JP,54-59,143,A, US,4,150,978,B, a triallyl pyrazoline derivative (US,3,820,989,B.) JP,51-93,224,A, JP,55-108,667,A, and an ARIRU amine derivative (US,3,180,730,B.) Organic light conductive materials, such as US,4,232,103,B, JP,55-144,250,A, JP,56-119,132,A, and a SUCHIRUBEN derivative (JP,58-190,953,A, JP,59-195,658,A), are indicated.

[0003]An organic EL device is mentioned as one of the art using an organic photoconducting

material. Promising ** of the use as an inexpensive solid luminescence type large area full color display element is carried out, and, as for EL element which uses an organic substance, many development is performed. Generally EL comprises a pair of opposite electrodes which sandwiched the luminous layer and this layer. When an electric field is impressed between two electrodes, an electron is poured in from the negative pole side and, as for luminescence, an electron hole is poured in from the anode side. When this electron re-combines with an electron hole in a luminous layer and an energy level returns from a conducting zone to a valence band, it is a phenomenon which releases energy as a light.

[0004]The conventional organic EL device had high drive voltage compared with inorganic EL element, and luminescence luminosity and its luminous efficiency were also low. Characteristic degradation had not resulted in utilization remarkably, either. In recent years, the organic EL device which laminated the thin film containing an organic compound with the high fluorescence quantum efficiency which emits light by the low voltage not more than 10V is reported, and the interest is attracted (refer to it applied physics Letters, 51 volumes, 913 pages, and 1987). The metal chelate complex was used for the fluorescent substance layer, it used the amine compound for the hole injection layer, and this method has obtained high-intensity green luminescence.

It is possible to drive on the direct-current voltage of 6-7V, and the highest luminosity 1000 (cd/m^2) and the maximum luminous efficiency 1.5 (lm/W) are attained, and it has the performance near a practical use field.

[0005]An organic EL device is an element provided with the luminous layer containing an organic fluorescent compound between the metal cathode layer and the transparent positive electrode layer. In order to obtain high-intensity luminescence by the low voltage, the electronic injection layer and the hole injection layer are added and element-ized. An exciton produces these organic EL devices by re-combination with the electron poured in from the negative pole, and the electron hole poured in from the anode, and light is emitted in the process in which this exciton carries out radiation inactivation (JP,S59-194393,A, JP,S63-295695,A). However, if direct-current voltage is impressed and it continues emitting light over a long time, crystallization of an organic compound, etc. will be promoted, it will become easy to flow through leakage current into an element, and an element will be destroyed. As an electron hole pouring material used for a hole injection layer, therefore, 4, 4', 4"-tris (N and N'-diphenylamino) bird phenylamine (TDATA), It is improving using compounds, such as 4, 4', and 4"-tris [N-(3-methylphenyl)-N-phenylamino] bird phenylamine (MTDATA) (JP,H4-308688,A). Although it is hard to crystallize since at least three-dimensional ** has structure, and these compounds are excellent also in thin film formation nature, they are not yet enough as an organic thin film which constitutes an organic EL device. Therefore, there was a problem

that an element deteriorated easily at the time of luminescence.

[0006][thus for development of the organic EL device whose luminous efficiency neither luminescence luminosity nor the luminescence stability at the time of repetition use was yet enough, the organic EL device by the present had bigger luminescence luminosity, and was / the organic EL device / high and which was excellent in the stability at the time of luminescence and preservation] It has the electron hole pouring capability to have excelled, and development of a durable material is desired.

[0007]

[Problem to be solved by the invention][by the purpose of this invention having the electron hole pouring capability to have excelled, its adhesion nature with metal and an organic compound being good, and being in providing a high durability organic EL device material, when it is made into a thin film, and using this organic EL device material further] Prolonged preservation is possible and a luminescence life is also aimed at providing a long organic EL device.

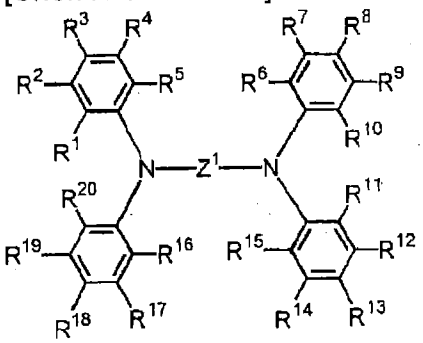
[0008]

[Means for solving problem]As a result of inquiring wholeheartedly, this invention persons found out that the element characteristic of the organic EL device produced at least using a kind of material shown by the general formula [1], the general formula [6], or a general formula [7], prolonged luminescence, and a preservation life were excellent, and resulted in this invention. That is, this invention is an electron hole pouring material for organic EL devices shown by the following general formula [1].

General formula [1]

[0009]

[Chemical formula 8]



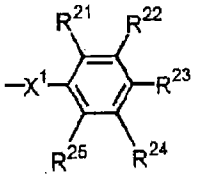
[0010]Independently R^1 - R^{20} among [type, respectively A hydrogen atom, a halogen atom, The alkoxy group which is not replaced [the alkyl group which is not replaced / substitution or /, substitution or], The CHIOARUKOKISHI machine which is not replaced [substitution or] and mono-**** express the condensed multi-ring machine which is not replaced [the monocycle machine which is not replaced / a JI substitution amino group, substitution, or /,

substitution, or] and the basis shown by the following general formula [2], however at least one of R^1 - the R^{20} is a substituent shown by a general formula [2]. The arylamine ring which is not replaced [the cycloalkyl ring which is not replaced / substitution or /, substitution, or] may be formed by the substituents which R^1-R^5, R^6-R^{10}, R^{11}-R^{15} or R^{16} - R^{20} adjoin.

General formula [2]

[0011]

[Chemical formula 9]



[0012]the inside of a formula, R^{21} - R^{25} -- respectively -- independent -- a hydrogen atom and a halogen atom. The CHIOARUKOKISHI machine which is not replaced [the alkoxy group which is not replaced / the alkyl group which is not replaced / substitution or /, substitution, or /, substitution, or] and mono-**** express the condensed multi-ring machine which is not replaced [the monocycle machine which is not replaced / a JI substitution amino group, substitution, or /, substitution, or]. R^{21} - R^{26} are adjoining substituents, and may form the arylamine ring which is not replaced [the cycloalkyl ring which is not replaced / substitution or /, substitution, or]. X^1 The alkylene machine which is not replaced [direct combination, substitution, or], -[$CR^{26}(R^{27})$] x-O-[$CR^{28}(R^{29})$] y-, - [-- CR -- $^{-30-}$ (R^{31}) --] -- x-S - [-- CR -- $^{--32--}$ (R^{33}) --] -- y - - O - - S - > -- C=O -- > -- SO -- $_{-\text{two}-}$ -- > -- SiR -- $^{--}$ -- $^{--34-}$ (R^{35}) - > -- NR -- $^{--36--}$ - > -- PR -- $^{--37--}$ - > -- P=O (R^{38}) -- expressing . R^{26} - R^{39} express the condensed multi-ring machine which is not replaced [the monocycle machine which is not replaced / the alkyl group which is not replaced / substitution or /, substitution, or /, substitution, or]. Although x and y express the integer of 0-8, respectively, neither x nor y is set to 0. Z^1 expresses the substituent shown by the following general formula [3], the following general formula [4], or the following general formula [5].

General formula [3]

[0013]

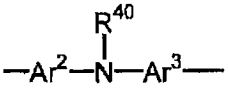
[Chemical formula 10]

—Ar^1—

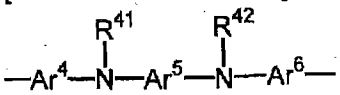
[0014](Ar^1 expresses the Ally Wren machine which is not replaced [substitution or].)

General formula [4]

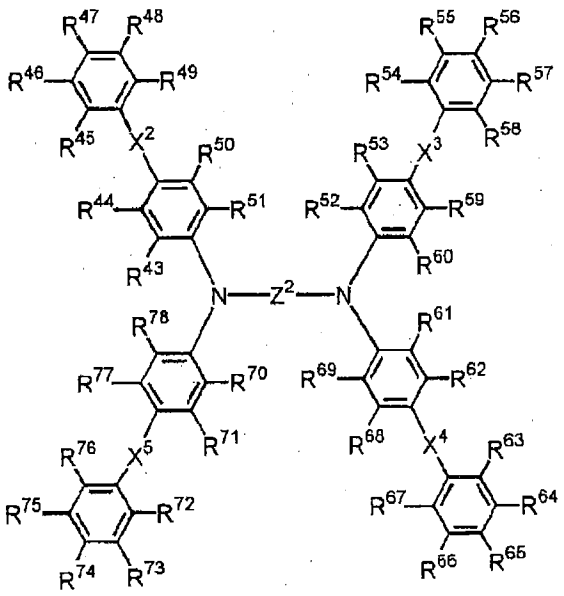
[0015]
[Chemical formula 11]



[0016](Ar^2 or Ar^3 expresses the Ally Wren machine which is not replaced [substitution or].) R^{40} expresses the condensed multi-ring machine which is not replaced [the monocycle machine which is not replaced / the alkyl group which is not replaced / substitution or /, substitution, or /, substitution, or].
General formula [5]
[0017]
[Chemical formula 12]



[0018](Ar^4 - Ar^6 express the Ally Wren machine which is not replaced [substitution or].) R^{41} or R^{42} expresses the condensed multi-ring machine which is not replaced [the monocycle machine which is not replaced / the alkyl group which is not replaced / substitution or /, substitution, or /, substitution, or].]
[0019]In a general formula [1], this invention R^1-R^5, R^6-R^{10}, R^{11}-R^{15} and R^{16} - the R^{20} is related with the above-mentioned electron hole pouring material for organic electroluminescence elements which is a substituent shown by a general formula [2]. This invention relates to the above-mentioned electron hole pouring material for organic electroluminescence elements shown by the following general formula [6].
General formula [6]
[0020]
[Chemical formula 13]



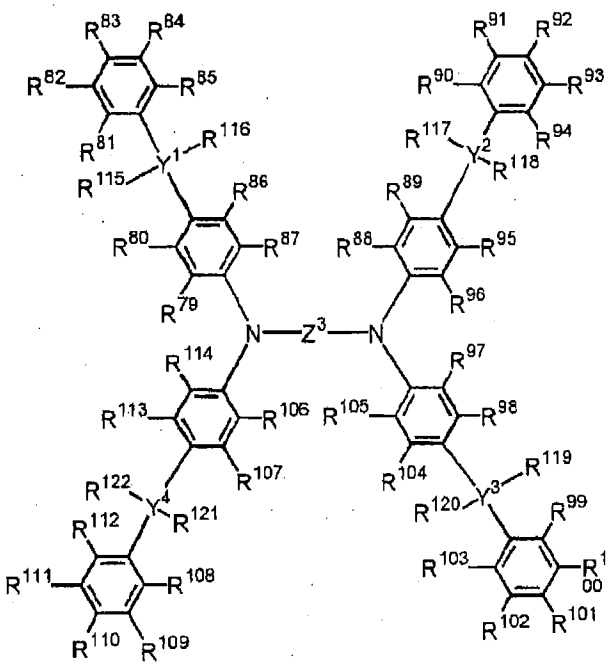
[0021]Independently R^{43} - R^{78} among [type, respectively A hydrogen atom, a halogen atom, The CHIOARUKOKISHI machine which is not replaced [the alkoxy group which is not replaced / the alkyl group which is not replaced / substitution or /, substitution, or /, substitution, or] and mono-**** express the condensed multi-ring machine which is not replaced [the monocycle machine which is not replaced / a JI substitution amino group, substitution, or /, substitution, or]. R^{43}, R^{44}, R^{45}-R^{49} and R^{50}, and R^{51}, R^{52}, R^{53}, R^{54}-R^{58} and R^{59}, and R^{60}, . [the substituents which R^{61}, R^{62}, R^{63}-R^{67} and R^{68}, R^{69} and R^{70}, R^{71}, R^{72}-R^{76} and R^{77}, and R^{78} adjoin] The arylamine ring which is not replaced [the cycloalkyl ring which is not replaced / substitution or /, substitution, or] may be formed. Z^2 expresses the same meaning as above-mentioned Z^1.]

[0022]This invention relates to Claim 1 shown by the following general formula [7] thru/or the electron hole pouring material for organic electroluminescence elements of any of Claim 3, or a description.

General formula [7]

[0023]

[Chemical formula 14]



[0024]R^{79} - R^{114} among [type The alkyl group which is not replaced [a hydrogen atom, a halogen atom, substitution, or], The CHIOARUKOKISHI machine which is not replaced [the alkoxy group which is not replaced / substitution or /, substitution, or] and mono-**** express the condensed multi-ring machine which is not replaced [the monocycle machine which is not replaced / a JI substitution amino group, substitution, or /, substitution, or]. R^{79}, R^{80}, R^{81}-R^{85} and R^{86}, and R^{87}, R^{88}, R^{89}, R^{90}-R^{94} and R^{95}, and R^{96}, R^{97}, R^{98}, R^{99}-R^{103} and R^{104}, R^{105} and R^{196}, R^{107}, R^{108}-R^{112} and R^{113}, and $R^{1.}$ [the substituents which ^{14} adjoins] The arylamine ring which is not replaced [the cycloalkyl ring which is not replaced / substitution or /, substitution, or] may be formed. R^{115} - R^{122} may express the condensed multi-ring machine which is not replaced [the monocycle machine which is not replaced / the alkyl group which is not replaced / a hydrogen atom, substitution, or /, substitution, or /, substitution, or], and may form a cycloalkyl ring by the adjoining substituents. Y^1 - Y^4 express a carbon atom or a silicon atom. Z^3 expresses the same meaning as above-mentioned Z^1.]

[0025]this invention -- inter-electrode [a pair of] -- much more -- or in the organic electroluminescence element provided with the luminous layer which consists of an organic compound thin film of two or more layers, At least one layer is related with the organic electroluminescence element being a layer containing the above-mentioned electron hole pouring material for organic electroluminescence elements.

[0026]In the organic electroluminescence element provided with the luminous layer from which this invention becomes inter-electrode [a pair of] from the organic compound thin film of two

or more layers, At least one layer between an anode and a luminous layer is related with the organic electroluminescence element being a layer containing the above-mentioned electron hole pouring material for organic electroluminescence elements.

[0027]In the organic electroluminescence element which this invention becomes from the organic compound thin film of two or more layers which contains a luminous layer in inter-electrode [a pair of], It has a hole injection layer of at least two layers between an anode and a luminous layer, and the hole injection layer which touches an anode is related with the organic electroluminescence element being a layer containing the above-mentioned electron hole pouring material for organic electroluminescence elements.

[0028]In the organic electroluminescence element provided with the luminous layer from which this invention becomes inter-electrode [a pair of] from the organic compound thin film of two or more layers, An organic electroluminescence element, wherein at least one layer of a luminous layer is a layer containing the above-mentioned electron hole pouring material for organic electroluminescence elements.

[0029]

[Mode for carrying out the invention]

[0030]There are fluoride, chlorine, bromine, and iodine as a halogen atom of the compound of the above-mentioned general formula. As an alkyl group which is not replaced [substitution or], a methyl group, an ethyl group, There are straight chain shape, such as a propyl group, a butyl group, a sec-butyl group, a tert-butyl group, a pentyl group, a hexyl group, a heptyl group, an octyl group, a stearyl machine, a trichloromethyl machine, the Tori Frollo methyl group, and a benzyl group, and a letter of branching.

[0031]As an alkoxy group which is not replaced [substitution or], there are a methoxy group, an ethoxy basis, a propoxy group, an n-butoxy machine, a sec-butoxy machine, a tert-butoxy machine, a pentyloxy machine, a hexyloxy machine, a stearyl OKISHI machine, a Tori Frollo methoxy group, etc.

[0032][as a CHIOARUKOKISHI machine which is not replaced / substitution or] a methylthio group, an ethyl thio group, a propyl thio group, n-butyl thio group, a sec-butyl thio group, a tert-butyl thio group, a pentyl thio group, and a hexyl thio group -- it passes and there are a petit RUCHIO machine, an octylthio machine, a stearyl thio group, a Tori Frollo methylthio group, etc.

[0033]As a JI substitution amino group, mono-****** A methylamino machine, a dimethylamino group, An ethylamino machine, a diethylamino machine, a dipropylamino machine, a dibutylamino machine, A diphenylamino machine, a ditolylamino machine, a JIBIFE nil amino group, a bis(aceto oxymethyl)amino group, There are a bis(aceto OKISHI ethyl)amino group, a bis(aceto OKISHI propyl)amino group, a bis(aceto OKISHI butyl)amino group, a benzylphenyl amino group, a dibenzylamino machine, etc.

[0034]As a monocycle machine, there are a monocycle cycloalkyl machine, a monocycle aryl group, a monocycle heterocyclic machine, etc. As a monocycle cycloalkyl machine, there is a cycloalkyl machine of the carbon numbers 4-8, such as a PUCHIRU machine and a cyclo octyl group, to a cyclo butyl group, a cyclopentylic group, a cyclohexyl group, and cyclo.
[0035]There is a phenyl group as a monocycle aryl group. As a monocycle heterocyclic machine, a CHIONIRU machine, a thiophenyl machine, a furanyl machine, There are a pyrrolyl machine, an imidazolyl group, a pyrazolyl machine, a pyridyl group, a pyrazyl machine, a pyrazinyl machine, a PIRIMIJI 2 RU machine, a PIRIDAJINIRU machine, an oxazolyl machine, a thiazolyl machine, an oxadiazolyl machine, a thiadiazolyl machine, an IMIDAJIAZORIRU machine, etc.
[0036]As a condensed multi-ring machine, there are a condensed multi-ring aryl group, a condensed multi-ring heterocyclic machine, a condensed multi-ring cycloalkyl machine, etc. as a condensed multi-ring aryl group -- a naphthyl group, an anthranil, a benzoanthranil, a phenan TORENIRU machine, a fluorenyl group, an acenaphtyl machine, and an azulenyl machine -- it passes and there are a PUTARENIRU machine, an ASENAFUCHIRENIRU machine, a pyrenyl machine, a triphenylene machine, etc.
[0037]As a condensed multi-ring heterocyclic machine, the India Lil machine, a quinolyl machine, an iso quinolyl machine, A phthalazinyl machine, a KINOKISARINIRU machine, a cinchona bark ZORINIRU machine, a carbazolyl machine, There are an acridinyl machine, a FENAJINIRU machine, a full frill machine, an iso thiazolyl machine, an isoxazolyl group, a furazanyl group, a phenoxazinyl machine, a benzoxazolyl machine, a benzothiazolyl machine, a benzoimidazolyl group, etc. As other condensed multi-ring machines, there are 1-tetralyl machine, a 2-tetralyl machine, a tetrahydro quinolyl machine, etc.
[0038]As a cycloalkyl ring which is not replaced [the substitution which may form a ring by adjoining substituents, or], there are a cyclo butyl ring, a cyclopentyl ring, a cyclohexyl ring, a cycloheptyl ring, a cyclo octyl ring, etc. [as an arylamine ring which is not replaced / the substitution which may form a ring by adjoining substituents, or] A benzene ring, a NAFUTAREN ring, an anthracene ring, a phenanthrene ring, a fluorene ring, an ASENAFUTAREN ring, an AZURENIUMU ring, the Cheb Thalen ring, an ASENAFUTAREN ring, a pyrene ring, a biphenyl ring, 4-ethyl biphenyl ring, a terphenyl ring, a quarter phenyl ring, BENZU [a]There are an anthracene ring, triphenylene ring, 2, 3-benzofluorene ring, 3, and 4-benzopyrene ring etc.
[0039]As a substituent of the above-mentioned monocycle machine or a condensed multi-ring machine, the above-mentioned halogen atom, an alkyl group, an alkoxy group, an alkylthio group, and the mono-****** can mention a JI substitution amino group, a monocycle machine, or a condensed multi-ring machine.
[0040]As an Ally Wren machine of Ar^1 - Ar^6, there are a phenylene group, a naphthylene

machine, the Ain Trani Wren machine, a phenan TORENIREN machine, a full ORENIREN machine, an ASENAFUCHIREN machine, a pyrenylene machine, a biphenylene machine, a terphenylene machine, a quarter phenylene group, etc.

[0041]The Ally Wren machine of the 2 values which may contain an oxygen atom, a sulfur atom, and a nitrogen atom is also contained as other Ally Wren machines. As an example of representation, a hula RENIREN machine, a dibenzo hula NIREN machine, a dibenzo SUBERONIREN machine, There are a dibenzo SUBERE nonylene group, an ANTORONIREN machine, an anthra KINORIREN machine, a FURUORE nonylene group, a CHIOFENIREN machine, a JIBENZOCHIO phenylene group, a JIBENZOCHIO phenylene SARUHON machine, a KARUBAZORIREN machine, an imino still BENIREN machine, etc.

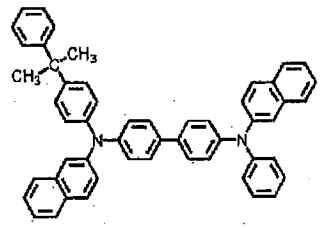
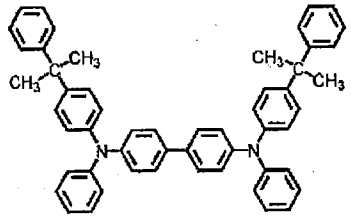
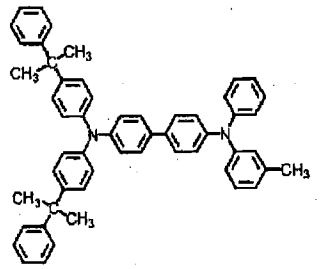
[0042]The Ally Wren machine of the 2 values which may be combined via an alkylene machine, an oxygen atom, a sulfur atom, a nitrogen atom, and a silicon atom is also contained. As an example of representation, diphenyl methane, benzophenone, diphenylamine, Diphenyl ether, diphenyl SURUFIDO, diphenylsulfone, Diphenyl SHIRAN, screw phenyl propane, screw phenyl hexafluoropropane, Screw FENOKISHI benzene, bis(FENOKISHI)biphenyl, bis [(FENOKISHI) phenyl] propane, There is an organic residue of 2 values, such as screw [(FENOKISHI) phenyl] Sour Hong, bis(phenyl)diisopropylbenzene, bis(phenyl)full OREN, and bis(phenyl)cyclohexane. The basis shown by R^1 - R^{20} may be added to the above-mentioned Ally Wren machine as a substituent.

[0043]The compound shown by the general formula [1], general formula [6], or general formula [7] of this invention is compoundable by the following methods, for example. In a flask, a polar solvent, a halogeno amine compound, a five to 8 time mol substitution aromatic amine compound, The aromatic amine compound which adds the catalyst of alkali, a metal atom, metallic compounds, etc., makes react above 200 ** for 5 to 50 hours, and is shown by the general formula [1], the general formula [6], or a general formula [7] is compounded.

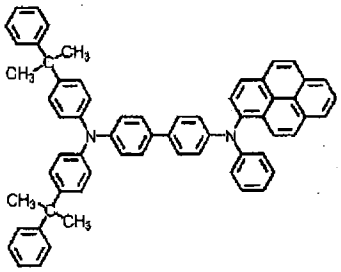
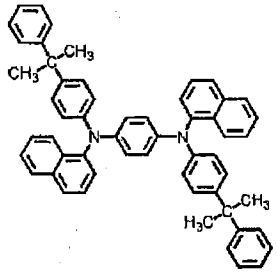
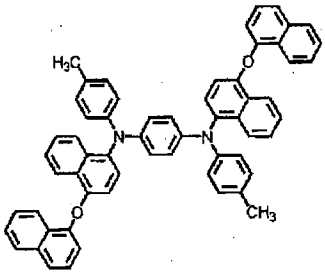
[0044]Although the example of representation of the compound shown by the general formula [1], the general formula [6], or a general formula [7] is concretely illustrated to Table 1, it is not limited to these.

[0045]

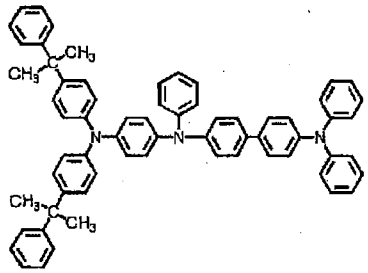
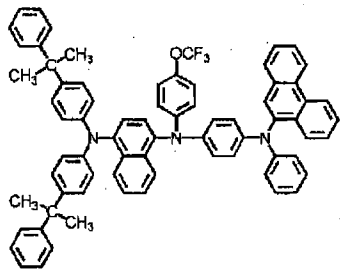
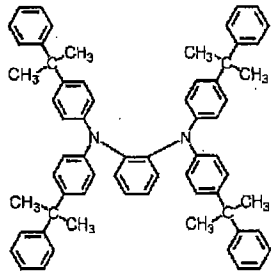
[Table 1]

No.	化　学　構　造　式
1	
2	
3	

[0046]

No.	化　学　構　造　式
4	
5	
6	

[0047]

No.	化学構造式
7	
8	
9	

[0048]

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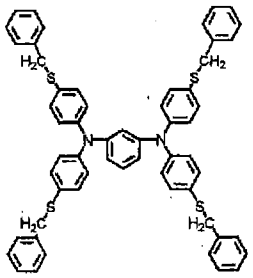
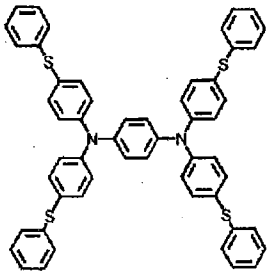
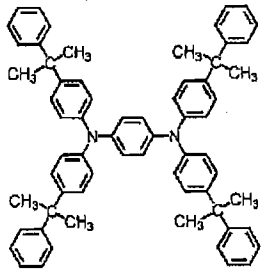
10	
11	
12	

[0049]

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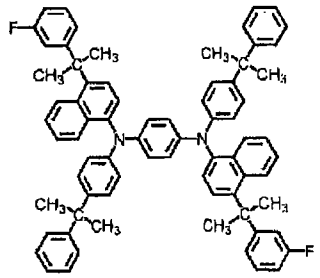
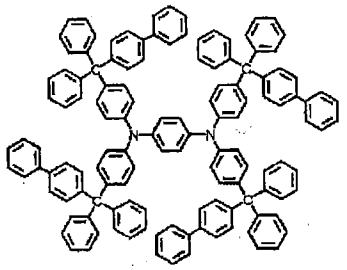
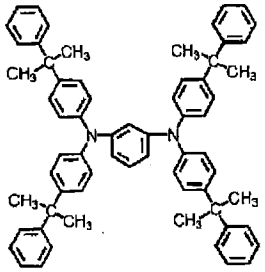
1 3	
1 4	
1 5	

[0050]

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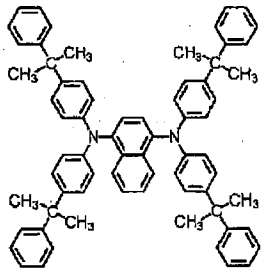
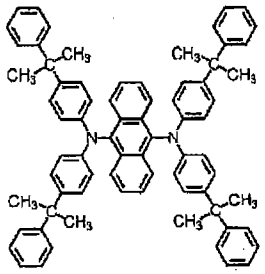
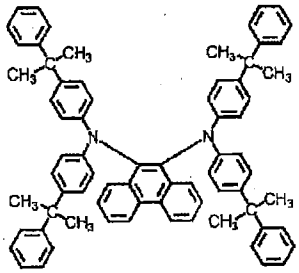
16	
17	
18	

[0051]

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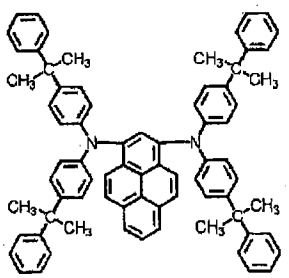
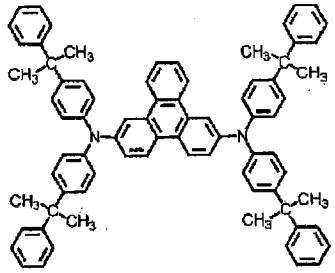
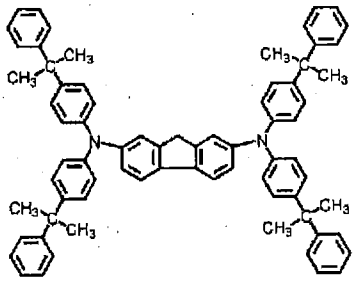
19	
20	
21	

[0052]

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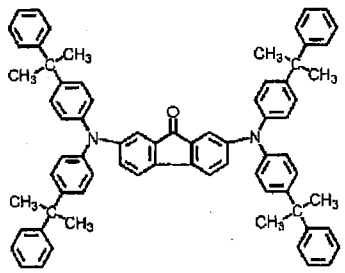
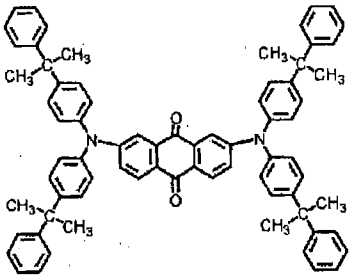
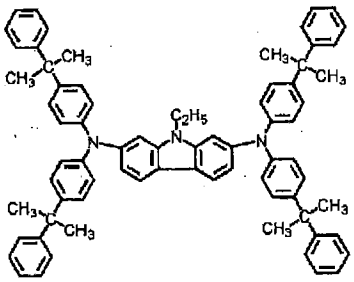
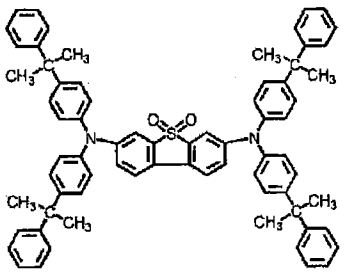
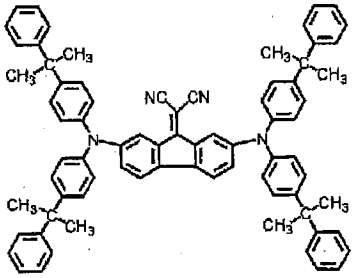
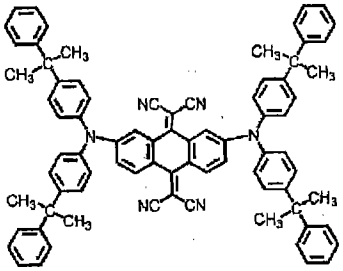
22	
23	
24	

[0053]

No.	化学構造式
25	
26	
27	

[0054]

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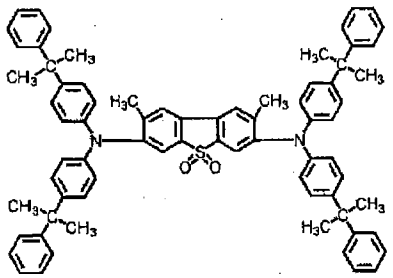
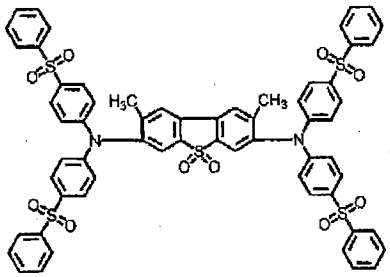
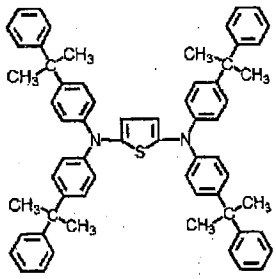
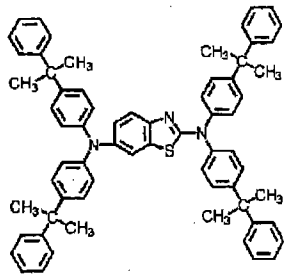
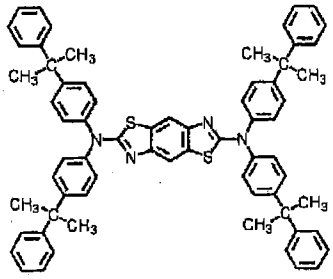
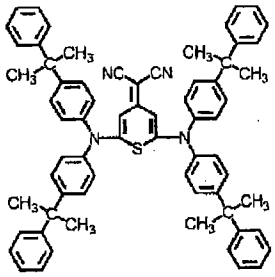
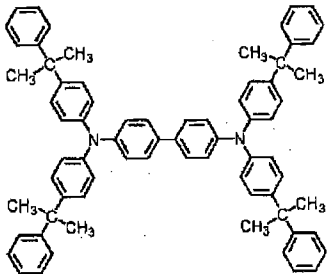
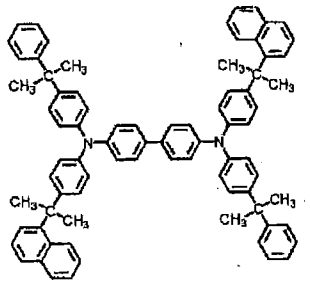
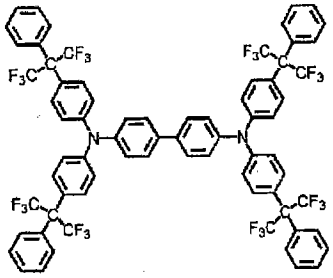
28	
29	
30	

[0055]

No.	化　学　構　造　式
3 1	
3 2	
3 3	

[0056]

No.	化　学　構　造　式
3 4	
3 5	
3 6	

[0057]

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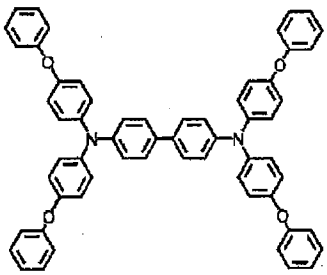
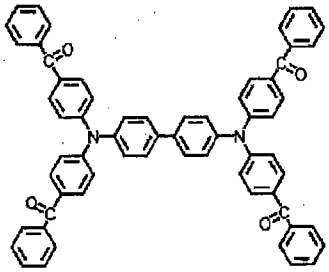
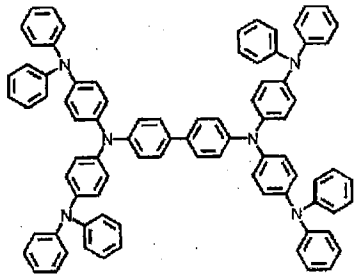
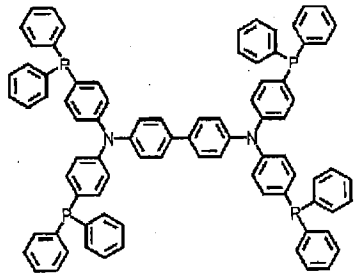
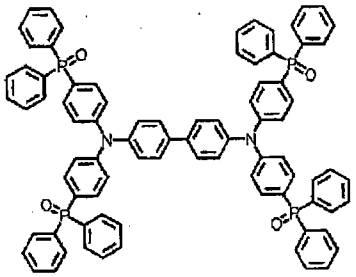
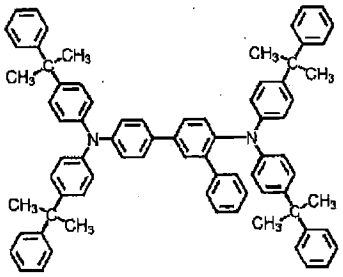
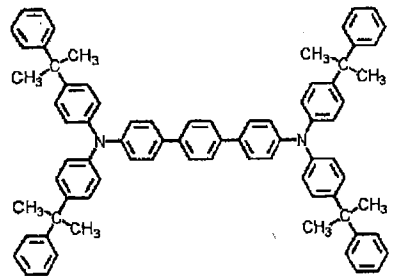
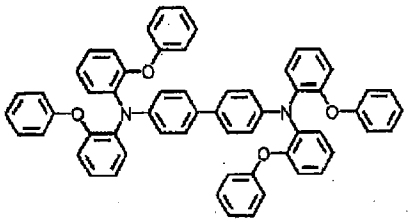
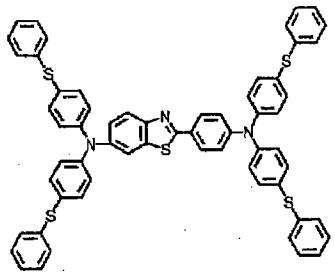
37	
38	
39	

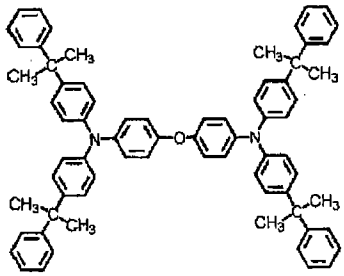
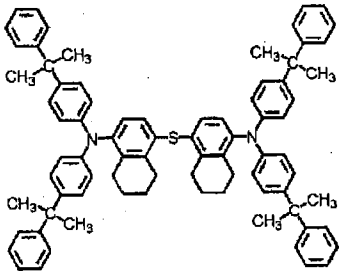
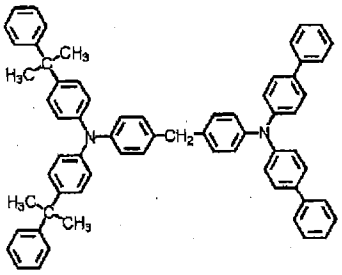
[0058]

No.	化学構造式
40	
41	
42	

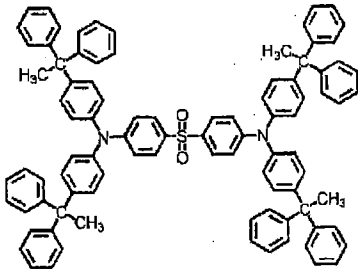
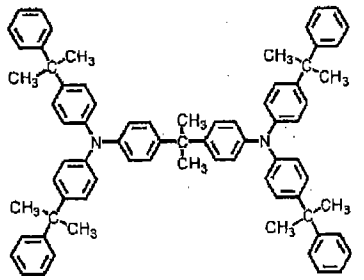
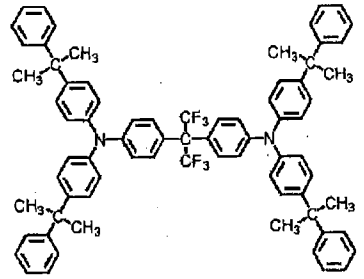
[0059]

No.	化学構造式
43	
44	
45	

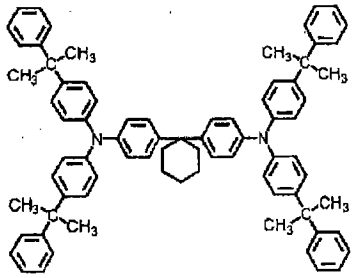
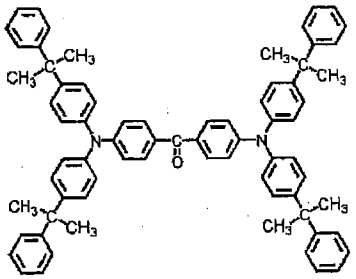
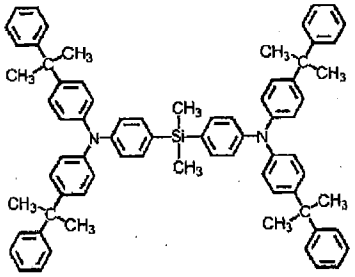
[0060]

No.	化学構造式
46	
47	
48	

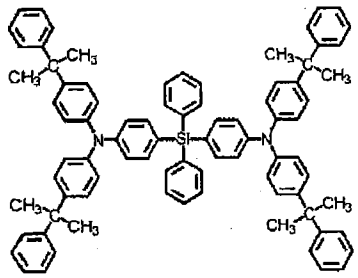
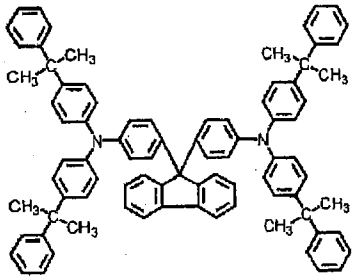
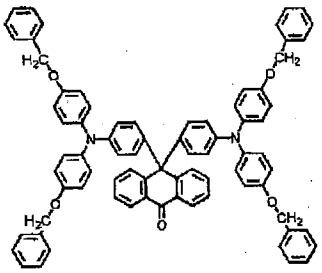
[0061]

No.	化学構造式
49	
50	
51	

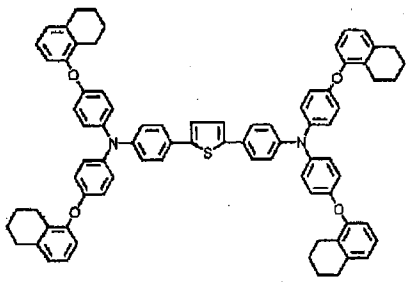
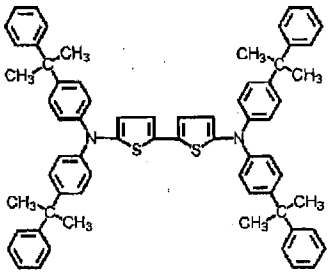
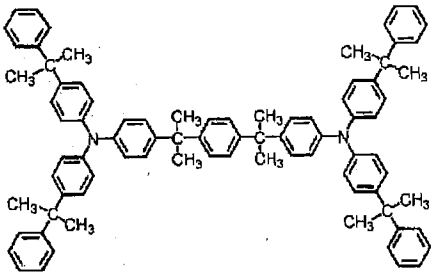
[0062]

No.	化学構造式
52	
53	
54	

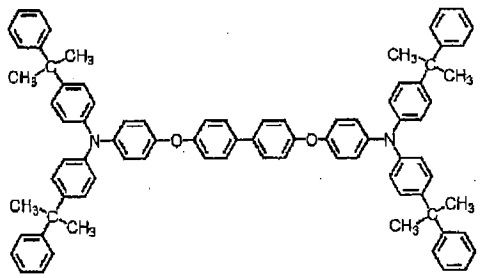
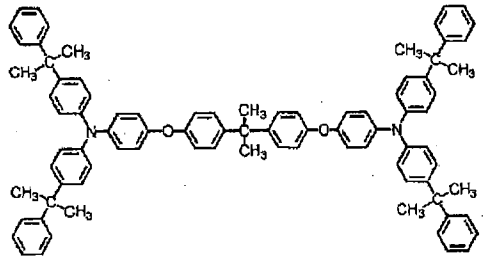
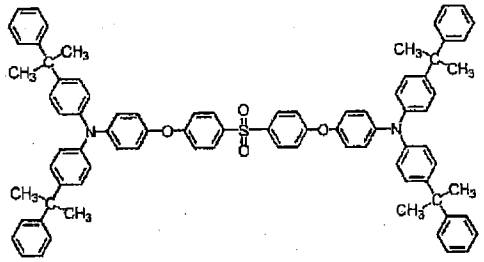
[0063]

No.	化学構造式
55	
56	
57	

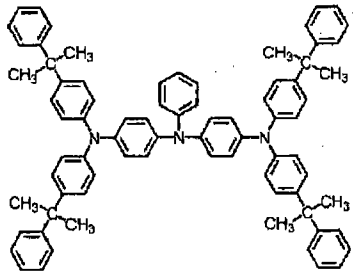
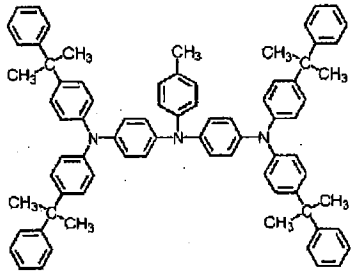
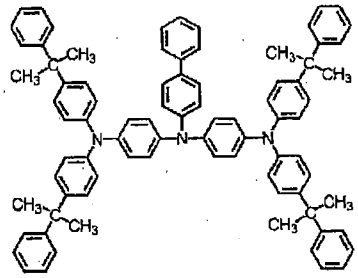
[0064]

No.	化学構造式
58	
59	
60	

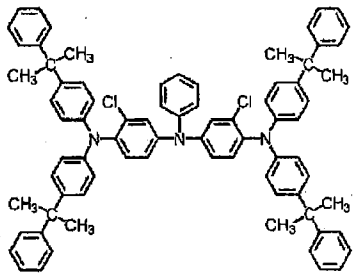
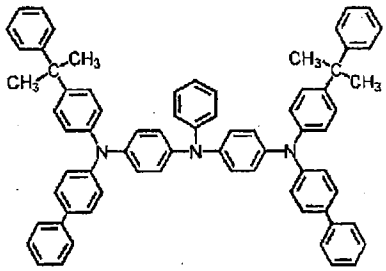
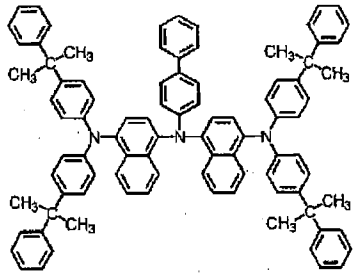
[0065]

No.	化　学　構　造　式
6 1	
6 2	
6 3	

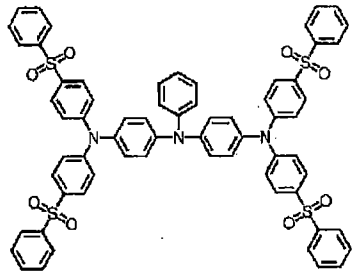
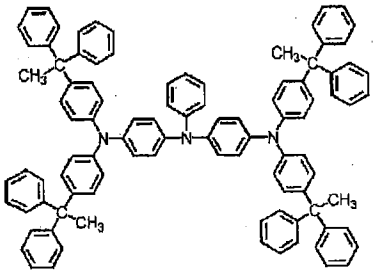
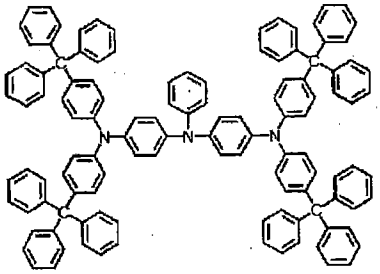
[0066]

No.	化　学　構　造　式
64	
65	
66	

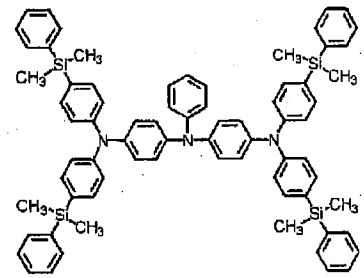
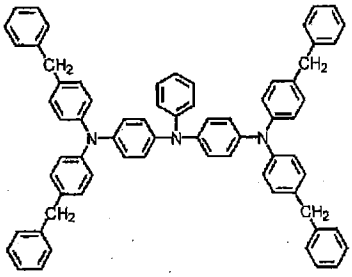
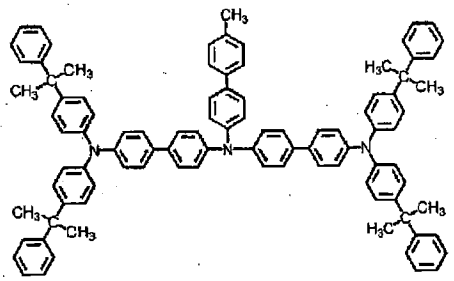
[0067]

No.	化　学　構　造　式
67	
68	
69	

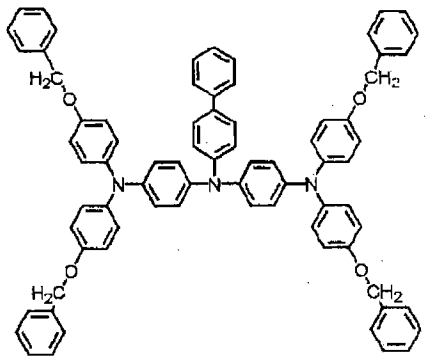
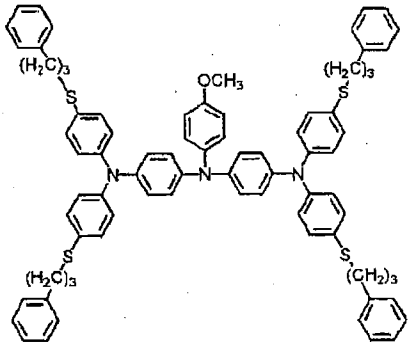
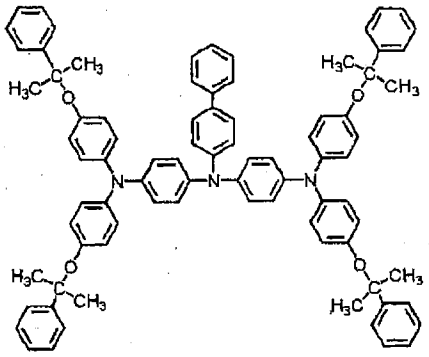
[0068]

No.	化　学　構　造　式
70	
71	
72	

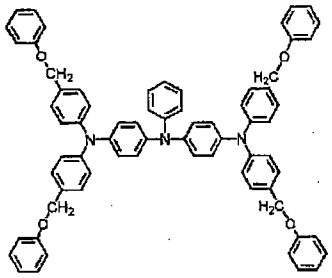
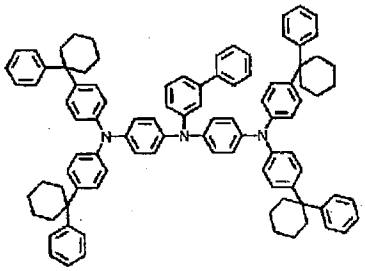
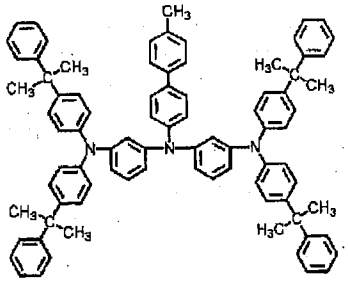
[0069]

No.	化学構造式
73	
74	
75	

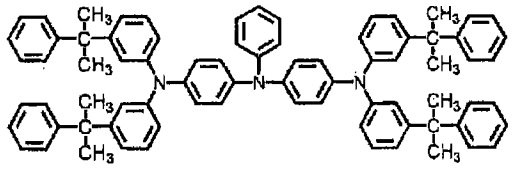
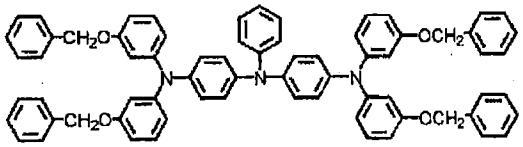
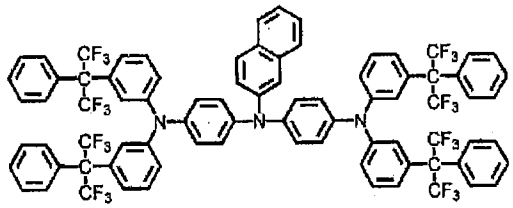
[0070]

No.	化　学　構　造　式
7 6	
7 7	
7 8	

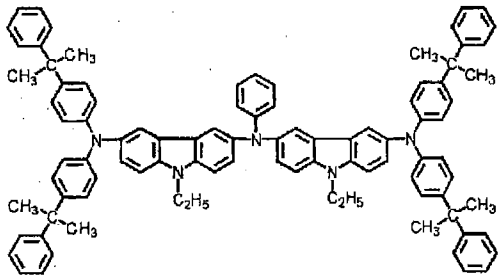
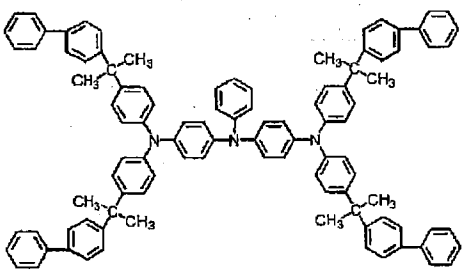
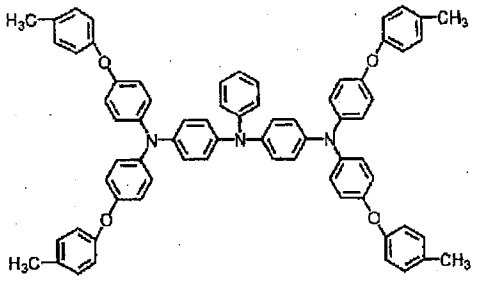
[0071]

No.	化学構造式
79	
80	
81	

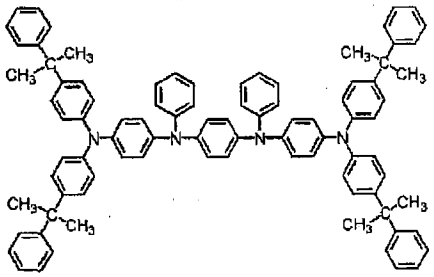
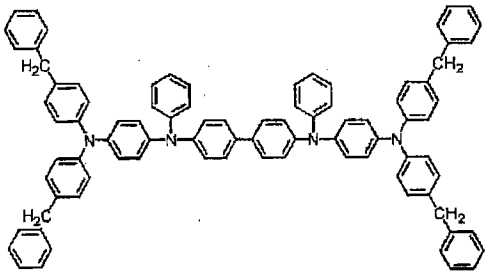
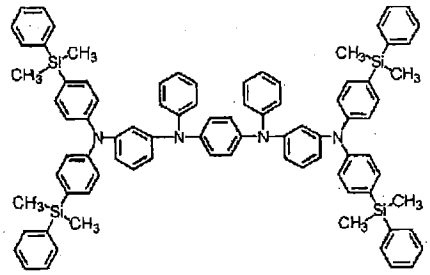
[0072]

No.	化　学　構　造　式
8 2	
8 3	
8 4	

[0073]

No.	化学構造式
85	
86	
87	

[0074]

No.	化学構造式
88	
89	
90	

[0075]Even if it uses the electric charge pouring material of this invention in the same layer, mixing with other electron holes or an electron injectional compound, it does not interfere. Since it excels in electron hole pouring nature, the compound of this invention can be used very effectively as a hole injectional material.

[0076]an organic EL device -- between an anode and the negative pole -- much more -- or it is an element in which the multilayer organic thin film was formed. In the case of the model, the luminous layer is further provided between an anode and the negative pole. A luminous layer contains a luminescent material, and in order to make the electron poured in from the electron hole which was poured in from the anode in addition to it, or the negative pole pour into a luminescent material, it may contain electron hole pouring material or electronic pouring material. The luminescent material itself may have electron hole pouring nature or electronic pouring nature. A multilayer type has the organic EL device laminated by the multilayered constitution of (an anode / hole injection layer / luminous layer / negative pole), (an anode / luminous layer / electronic injection layer / negative pole), and (an anode / hole injection layer /

luminous layer / electronic injection layer / negative pole). The compound of a general formula [1], a general formula [6], or a general formula [7] can be used in every element composition. The compound of a general formula [1], a general formula [6], or a general formula [7] can be used as an electron hole pouring material also in which layer of a hole injection layer or a luminous layer. Since the electron hole pouring material of this invention has a function which conveys the electron hole from an anode to an organic layer which electron-hole-pouring-functioned and was poured in, and is poured into a luminous layer, even if it has two or more layers as a hole injection layer of an electron hole pouring zone, it can also be used for which hole injection layer. The thin film formed with the compound of a general formula [1], a general formula [6], or a general formula [7] has amorphous nature, and since heat resistance is also good, also in the prolonged preservation at the time of using a thin film, the luminescence life at the time of making an element drive, etc., it is advantageous. [the compound of a general formula [1], a general formula [6], or a general formula [7]] Since the adhesion nature to metal electrodes, such as ITO, is also good, the ionization potential of a film film is also low and it is advantageous to electron hole pouring from an anode, It is still more advantageous to use the compound of a general formula [1], a general formula [6], or a general formula [7] for the hole injection layer by the side of a metal electrode (anode), when a hole injection layer is made into two or more layers.

[0077]In addition to the compound of the general formula [1] of this invention, a luminescent material, doping material, and the electron hole pouring material and electronic pouring material that perform carrier pouring can also be used for a luminous layer if necessary. In the case of the two-layer structure, the luminous layer and the hole injection layer are separated. The electron hole pouring efficiency from a hole injection layer to a luminous layer can improve, and luminescence luminosity and luminous efficiency can be made to increase according to this structure. In this case, for luminescence, it is desirable that the luminescent material itself used for a luminous layer has electronic pouring nature or to add electronic pouring material in a luminous layer. As another layer composition, there is the two-layer structure by the luminous layer and an electronic injection layer. In this case, it is desirable that the luminescent material itself has electron hole pouring nature or to add electron hole pouring material in a luminous layer.

[0078]In the case of three-layer structure, it has a luminous layer, a hole injection layer, and an electronic injection layer, and it is raising the electron hole in a luminous layer, and the efficiency of an electronic re-combination. Thus, the fall of the luminosity by quenching or a life can be prevented by making an organic EL device into multilayer structure. Also in the element of such a multilayer structure, it can be used if necessary combining a luminescent material, doping material, and the electron hole pouring material and electronic pouring material that perform carrier pouring. The hole injection layer, the luminous layer, and the electronic

injection layer may be formed by two or more layers, respectively.
[0079][as a conductive material used for the anode of an organic EL device] The thing with a bigger work function than 4 eV is suitable, and Carbon, aluminum, Organic conductive resin, such as metal oxide, such as tin oxide, indium oxide, etc. which are called those alloys, an ITO board, and a NESA board, such as vanadium, iron, cobalt, nickel, tungsten, silver, gold, platinum, and palladium, and also poly CHIOFEN, and polypyrrole, is used. What has a work function smaller than 4 eV as a conductive material used for the negative pole is preferred, and those alloys, such as magnesium, calcium, tin, a lead, titanium, yttrium, lithium, RUTENIUMU, and manganese, are used. As an alloy, although there is magnesium/silver, magnesium/indium, lithium / aluminum, it is not limited to these and the metal ratio of an alloy is not limited, either. As long as an anode and the negative pole have necessity, they may be formed by two or more layers.
[0080]In order to make light emit efficiently in an organic EL device, in the luminescence wavelength area of an element, the transparent enough thing of at least one side is desirable. It is desirable for a substrate to be also transparent. The above-mentioned conductive material is used for a transparent electrode, and it sets it up to secure predetermined light transmission nature by methods, such as vapor deposition and sputtering. As for the electrode of a light-emitting surface, it is desirable to make optical transmittance not less than 10%. It has mechanical and thermal intensity, if transparent, it is not limited, but when a substrate is illustrated, it may have transparency resin, such as a glass substrate, polyethylene, polyether sulphone, and polypropylene, and any of tabular and the shape of a film may be sufficient as it.

[0081]The formation of each layer of the organic EL device concerning this invention can also apply which method of the wet forming-membranes methods, such as the dry type forming-membranes methods, such as vacuum deposition and sputtering, spin coating, dipping. Although film thickness in particular is not limited, it needs to set each layer as suitable film thickness. If film thickness is too thick, in order to obtain fixed optical power, big impressed electromotive force will be needed and efficiency will worsen. If film thickness is too thin, even if a pinhole etc. will occur and it will impress an electric field, sufficient luminescence luminosity is not obtained. The usual film thickness has the still more preferred range of 0.2 micrometer from 10 nm, although the range of 10 micrometers is suitable from 5 nm.
[0082]The solvent may be any, although the material which forms each layer is dissolved or distributed to suitable solvents, such as chloroform, a tetrahydro franc, and dioxane, in the case of the wet forming-membranes method and a thin film is formed. Also in which thin film, suitable resin and additive agent may be used on a membrane formation disposition for pinhole prevention of a film etc. As resin used in this invention, polystyrene, polycarbonate, Poly arylate, polyester, polyamide, polyurethane, polysulfone, Conductive resin, such as photo

electroconductive polymer, such as insulating resin, such as polymethyl methacrylate, polymethyl acrylate, and cellulose, poly-N-vinylcarbazole, and polysilane, poly CHIOFEN, and polypyrrole, can be mentioned. An antioxidant, an ultraviolet ray absorbent, a plasticizer, etc. can be mentioned as an additive agent.

[0083][as the luminescent material which can be used for the organic EL device of this invention, or a doping material] Anthracene, NAFUTAREN, phenanthrene, pyrene, TETORASEN, KORONEN, KURISEN, fluorescein, PERIREN, phtalo PERIREN, Naphthalo PERIREN, PERINON, phtalo PERINON, naphthalo PERINON, Diphenyl butadiene, tetra-phenyl butadiene, Kumarin, oxadiazole, Aldazine, screw benzoKISAZORIN, screw styryl, pyrazine, cyclo pen TAJIEN, A quinoline metal complex, an amino quinoline metal complex, a benzoquinoline metal complex, Imine, diphenyl ethylene, vinyl anthracene, JIAMINO carbazole, Bird phenylamine, benzidine type bird phenylamine, styryl amine type bird phenylamine, Although there are those derivatives, such as diamine type bird phenylamine PIRAN, thiopyran, poly methine, merocyanine, an imidazole chelation OKISHINOIDO compound, cinchona bark KURIDON, and rubrene, it is not limited to these.

[0084][as an electron hole pouring material which can be used combining with the electron hole pouring material of a general formula [1], a general formula [6], or a general formula [7]] The compound which has the capability to convey an electron hole, has the electron hole pouring effect of having excelled to the luminous layer or the luminescent material, and prevented movement into the electronic injection layer or electronic transportation material of an exciton generated by the luminous layer, and was excellent in thin film organization potency is mentioned. Specifically A phthalocyanine system compound, a naphthalocyanine system compound, a porphyrin system compound, oxadiazole, and doria -- ZORU and imidazole. Imidazolone, imidazole thione, PIRAZORIN, PIRAZORON, tetrahydro imidazole, OKISAZORU, oxadiazole, hydrazone, ASHIRU hydrazone, Poly ARIRU Alekan, SUCHIRUBEN, butadiene, benzidine type bird phenylamine, styryl amine type bird phenylamine, diamine type bird phenylamine, etc., Although there are polymer materials, such as those derivatives and polyvinyl carbazole, polysilane, and a conductive polymer, etc., it is not limited to these.

[0085]The compound which has the capability to convey an electron, as an electronic pouring material, has the electronic pouring effect of having excelled to the luminous layer or the luminescent material, and prevented movement into the hole injection layer or electron hole pouring material of an exciton generated by the luminous layer, and was excellent in thin film organization potency is mentioned. For example, although there are a fluorenone, anthra KINOJI methane, diphenoquinone, thiopyran dioxide, oxadiazole, PERIREN tetracarboxylic acid, FUREORENIRIDEN methane, anthra KINOJI methane, Antron, etc. and those derivatives, it is not limited to these. Electronic acceptance material can be added into electron hole pouring material, electron release nature material can be added into electronic pouring

material, and a feeling of increase can be carried out.

[0086][the compound of the general formula [1] of this invention, a general formula [6], or a general formula [7]] It can be used for which layer and at least one sort of a luminescent material, doping material, electron hole pouring material, and electronic pouring material other than the compound of a general formula [1], a general formula [6], or a general formula [7] may contain in the same layer. It is also possible to provide a protection layer on the surface of an element, or to enclose silicone oil etc. and to protect the whole element for the improvement of stability to the temperature of the organic EL device obtained by this invention, humidity, atmosphere, etc. As mentioned above, in this invention, since the compound of the general formula [1], the general formula [6], or the general formula [7] was used for the organic EL device, luminous efficiency and luminescence luminosity were able to be made high. Since it was stable and usable luminescence luminosity was obtained practical on still lower drive voltage to heat or current, luminosity degradation at the time of continuation luminescence which was a big problem to the former was also able to improve this element sharply. The organic EL device of this invention can consider application as a flat-panel display and plane photogens, such as a flat TV, to light sources, such as a copying machine and a printer, light sources, such as a liquid crystal display and instruments, a display board, a beacon light, etc., and the industrial value is very large.

[0087]It can be considered as an organic EL device, and cannot accept and come out, and a photoelectric conversion element, a solar cell, an image sensor, etc. can be used for the material of this invention as an electron hole transportation material also in which field of an organic photoconducting material.

[0088]

[Working example]Hereafter, this invention is explained in detail based on an embodiment. According to DSC analysis. [many of compounds shown by the general formula [1], general formula [6], and general formula [7] of this invention] It compares with 4, 4', and 4"-tris [N-(3-methylphenyl)-N-phenylamino] bird phenylamine which are used to the former as an amorphous electron hole pouring material, It turns out that it has heat resistance high glass transition point temperature, the melting point, and a decomposition point and high as an electron hole pouring material of an organic EL device. [the compound shown by the general formula [1], general formula [6], and general formula [7] of this invention] Crystallinity is low, since it is an amorphous compound, adhesion nature with an anode board or an organic thin film layer is also good, and there are tolerance over the environment as an organic thin film and big predominancy also about the luminescence life at the time of driving an organic EL device and the preservability of an element.

[0089]On the glass board with an ITO electrode washed embodiment 1, vacuum deposition of the compound (12) was carried out, and the hole injection layer of 30 nm of film thickness was

obtained. Subsequently, vacuum deposition of the tris (8-hydroxy quinoline) aluminium complex was carried out, the luminous layer of 50 nm of film thickness was created, the electrode of 150 nm of film thickness was formed on it with the alloy which mixed silver with magnesium by 10:1, and the organic EL device was obtained. The hole injection layer and the luminous layer were vapor-deposited under the conditions of substrate temperature room temperature in the vacuum of 10^{-6}Torr. As for this element, green luminescence of the luminescence luminosity 240 (cd/m^2), the maximum luminescence luminosity 16500 (cd/m^2), and luminous efficiency 1.9 (lm/W) was obtained on the direct-current voltage 5V.

[0090]The organic EL device was produced by the same method as Embodiment 1 except forming the compound (36) which dissolved embodiment 2 hole injection layer in chloroform with a spin coat method. As for this element, green luminescence of the luminescence luminosity 220 (cd/m^2), the maximum luminescence luminosity 18000 (cd/m^2), and luminous efficiency 2.0 (lm/W) was obtained on the direct-current voltage 5V.

[0091]On the glass board with an ITO electrode washed embodiment 3, vacuum deposition of the compound (34) was carried out, and the first hole injection layer of 40 nm of film thickness was obtained. Subsequently, vacuum deposition of the 4 and 4' bis[-] [N-(1-Naff Chill)-N-phenylamino] biphenyl was carried out, and the second hole injection layer of 10 nm of film thickness was obtained. Vacuum deposition of the tris (8-hydroxy quinoline) aluminium complex was carried out, the electronic injection luminescence layer of 40 nm of film thickness was created, the electrode of 150 nm of film thickness was formed on it with the alloy which mixed silver with magnesium by 10:1, and the organic EL device was obtained. The hole injection layer and the luminous layer were vapor-deposited under the conditions of substrate temperature room temperature in the vacuum of 10^{-6}Torr. As for this element, green luminescence of the luminescence luminosity 370 (cd/m^2), the maximum luminescence luminosity 22000 (cd/m^2), and luminous efficiency 2.1 (lm/W) was obtained on the direct-current voltage 5V.

[0092]On a glass board with an ITO electrode washed embodiment 4-93, vacuum deposition of the compound shown in Table 1 was carried out, and the first hole injection layer of 40 nm of film thickness was obtained. Subsequently, vacuum deposition of the 4 and 4' bis[-] [N-(1-Naff Chill)-N-phenylamino] biphenyl was carried out, and the second hole injection layer of 10 nm of film thickness was obtained. Carry out vacuum deposition of the tris (8-hydroxy quinoline) aluminium complex, and a luminous layer of 50 nm of film thickness is created, Vacuum deposition of the bis(2-methyl 8-hydroxyquinolinate)(1-phenolate) gallium complex was carried out, an electronic injection layer of 30 nm of film thickness was created, an electrode of 150 nm of film thickness was formed on it with an alloy which mixed aluminum and lithium by 25:1, and an organic EL device was obtained. A hole injection layer and a luminous layer were

vapor-deposited in a vacuum of 10^{-6}Torr, and substrate temperature was vapor-deposited under conditions of room temperature. Green luminescence these elements were indicated to be in Table 2 was obtained.

[0093]

[Table 2]

実施例	化合物	発光輝度 (cd／m²)	最大発光輝度 (cd／m²)	発光効率 (lm／W)
4	(1)	260	21,000	2.3
5	(2)	250	20,000	1.9
6	(3)	290	22,000	2.2
7	(4)	250	19,000	1.8
8	(5)	280	21,000	2.0
9	(6)	300	20,000	2.2
10	(7)	350	24,000	2.4
11	(8)	320	22,000	2.1
12	(9)	390	23,000	2.5
13	(10)	330	26,000	2.3
14	(11)	310	22,000	2.1
15	(12)	390	31,000	2.6
16	(13)	360	26,000	2.3
17	(14)	350	27,000	2.3
18	(15)	320	24,000	2.5
19	(16)	330	23,000	2.4
20	(17)	350	31,000	2.7
21	(18)	330	29,000	2.5
22	(19)	310	25,000	2.2
23	(20)	330	26,000	2.6
24	(21)	320	25,000	2.3
25	(22)	290	23,000	2.1
26	(23)	280	23,000	2.1
27	(24)	310	25,000	2.3
28	(25)	280	22,000	2.2
29	(26)	280	24,000	2.3
30	(27)	280	23,000	2.1
31	(28)	310	26,000	2.5

発光輝度と発光効率は直流5（V）印加時の値を示す。

[0094]

実施例	化合物	発光輝度 (cd／m²)	最大発光輝度 (cd／m²)	発光効率 (lm／W)
32	(29)	310	26,000	2.2
33	(30)	250	21,000	2.0
34	(31)	240	23,000	2.1
35	(32)	330	25,000	2.3
36	(33)	320	23,000	2.2
37	(34)	420	31,000	2.7
38	(35)	390	27,000	2.4
39	(36)	410	28,000	2.5
40	(37)	380	27,000	2.2
41	(38)	400	28,000	2.6
42	(39)	350	26,000	2.2
43	(40)	330	25,000	2.4
44	(41)	320	24,000	2.3
45	(42)	400	28,000	2.7
46	(43)	380	25,000	2.5
47	(44)	310	22,000	2.3
48	(45)	330	27,000	2.5
49	(46)	370	27,000	2.7
50	(47)	340	25,000	2.5
51	(48)	370	30,000	2.7
52	(49)	330	25,000	2.3
53	(50)	370	28,000	2.4
54	(51)	350	26,000	2.3
55	(52)	360	25,000	2.8
56	(53)	340	27,000	2.8
57	(54)	330	27,000	2.3
58	(55)	360	28,000	2.2
59	(56)	360	26,000	2.5

発光輝度と発光効率は直流5（V）印加時の値を示す。

[0095]

実施例	化合物	発光輝度 (cd/m²)	最大発光輝度 (cd/m²)	発光効率 (lm/W)
60	(57)	370	27,000	2.4
61	(58)	360	25,000	2.2
62	(59)	350	24,000	2.6
63	(60)	330	30,000	2.5
64	(61)	320	25,000	2.4
65	(62)	320	26,000	2.4
66	(63)	310	26,000	2.3
67	(64)	380	31,000	2.8
68	(65)	370	32,000	2.7
69	(66)	390	31,000	3.0
70	(67)	330	28,000	2.5
71	(68)	320	28,000	2.6
72	(69)	350	28,000	2.5
73	(70)	340	25,000	2.3
74	(71)	380	31,000	2.7
75	(72)	390	30,000	2.6
76	(73)	350	31,000	2.8
77	(74)	370	33,000	2.8
78	(75)	360	31,000	2.9
79	(76)	330	27,000	2.6
80	(77)	340	31,000	2.4
81	(78)	380	32,000	2.3
82	(79)	360	30,000	2.5
83	(80)	340	32,000	2.6
84	(81)	370	33,000	2.7
85	(82)	340	29,000	2.7
86	(83)	330	30,000	2.5
87	(84)	360	32,000	2.4

発光輝度と発光効率は直流6（V）印加時の値を示す。

[0096]

実施例	化合物	発光輝度 (cd/m²)	最大発光輝度 (cd/m²)	発光効率 (lm/W)
88	(85)	270	31,000	2.2
89	(86)	310	28,000	2.8
90	(87)	380	23,000	2.4
91	(88)	360	29,000	2.5
92	(89)	350	31,000	2.6
93	(90)	340	29,000	2.6

[0097]On the glass board with an ITO electrode washed embodiment 94, vacuum deposition of the compound (35) was carried out, and the first hole injection layer of 40 nm of film thickness was obtained. Subsequently, vacuum deposition of the 4 and 4' bis[-] [N-(1-Naff Chill)-N-phenylamino] biphenyl was carried out, and the second hole injection layer of 10 nm of film thickness was obtained. Carry out vacuum deposition of N, N, N', the N'-[4-(alpha and alpha'-dimethylbenzyl) phenyl]-anthranil 9, and 10-Gia Min, and the luminous layer of 50 nm of film thickness is created, Vacuum deposition of the tris (8-hydroxy quinoline) aluminium complex was carried out, the electronic injection layer of 40 nm of film thickness was created, the electrode of 150 nm of film thickness was formed on it with the alloy which mixed silver with magnesium by 10:1, and the organic EL device was obtained. The hole injection layer and the

luminous layer were vapor-deposited under the conditions of substrate temperature room temperature in the vacuum of 10^{-6}Torr. As for this element, green luminescence of the luminescence luminosity 570 (cd/m^2), the maximum luminescence luminosity 66000 (cd/m^2), and luminous efficiency 5.5 (lm/W) was obtained on the direct-current voltage 5V.

[0098]The organic EL device was produced by the same method as Embodiment 94 except replacing with Embodiment 954 and 4' bis[-] [N-(1-Naff Chill)-N-phenylamino] biphenyl, and using a compound (56) for the second hole injection layer. As for this element, green luminescence of the luminescence luminosity 600 (cd/m^2), the maximum luminescence luminosity 69000 (cd/m^2), and luminous efficiency 6.0 (lm/W) was obtained on the direct-current voltage 5V.

[0099]The organic EL device was produced by the same method as Embodiment 94 except replacing with embodiment 96 compound (35), replacing a compound (34) with 4 and 4' bis[-] [N-(1-Naff Chill)-N-phenylamino] biphenyl at the first hole injection layer, and using a compound (12) for the second hole injection layer. As for this element, green luminescence of the luminescence luminosity 720 (cd/m^2), the maximum luminescence luminosity 73000 (cd/m^2), and luminous efficiency 6.3 (lm/W) was obtained on the direct-current voltage 5V.

[0100]The organic EL device was produced by the same method as Embodiment 94 to the embodiment 97 first hole injection layer at a compound (66) and the second hole injection layer except carrying out compound (56) use. As for this element, green luminescence of the luminescence luminosity 620 (cd/m^2), the maximum luminescence luminosity 73000 (cd/m^2), and luminous efficiency 6.3 (lm/W) was obtained on the direct-current voltage 5V.

[0101]The organic EL device was produced by the same method as Embodiment 94 except replacing with an embodiment 98 tris (8-hydroxy quinoline) aluminium complex, and using a bis(2-methyl 8-hydroxyquinolinate)(1-phenolate) gallium complex for an electronic injection layer. As for this element, green luminescence of the luminescence luminosity 820 (cd/m^2), the maximum luminescence luminosity 102000 (cd/m^2), and luminous efficiency 10.5 (lm/W) was obtained on the direct-current voltage 5V.

[0102]On the glass board with an ITO electrode washed embodiment 99, vacuum deposition of the compound (74) was carried out, and the hole injection layer of 40 nm of film thickness was obtained. Subsequently, carry out vacuum deposition of a compound (34) and the rubrene by the weight ratio 20:1, and the luminous layer of 50 nm of film thickness is created, Vacuum deposition of the tris (8-hydroxy quinoline) aluminium complex was carried out, the electronic injection layer of 40 nm of film thickness was created, the electrode of 150 nm of film thickness was formed on it with the alloy which mixed silver with magnesium by 10:1, and the organic EL device was obtained. The hole injection layer and the luminous layer were vapor-deposited

under the conditions of substrate temperature room temperature in the vacuum of 10^{-6}Torr. As for this element, the yellow light of the luminescence luminosity 420 (cd/m^2), the maximum luminescence luminosity 45000 (cd/m^2), and luminous efficiency 4.2 (lm/W) was obtained on the direct-current voltage 5V.

[0103]An embodiment 100 tris (8-hydroxy quinoline) aluminium complex and cinchona bark KURIDON were vapor-deposited by the weight ratio 40:1, and the organic EL device was produced by the same method as Embodiment 94 except obtaining the luminous layer of 40 nm of film thickness. As for this element, green luminescence of the luminescence luminosity 510 (cd/m^2), the maximum luminescence luminosity 49000 (cd/m^2), and luminous efficiency 4.2 (lm/W) was obtained on the direct-current voltage 5V.

[0104]Instead of obtaining the negative pole of 150 nm of film thickness with the alloy which mixed silver with embodiment 101 magnesium by 10:1, the organic EL device was produced by the same method as Embodiment 94 except obtaining the negative pole of 150 nm of film thickness with the alloy which mixed aluminum and lithium by 10:1. As for this element, green luminescence of the luminescence luminosity 620 (cd/m^2), the maximum luminescence luminosity 72000 (cd/m^2), and luminous efficiency 5.2 (lm/W) was obtained on the direct-current voltage 5V.

[0105]It replaced with the compound (12) of comparative example 1 hole injection layer, and the organic EL device was created by the same method as Embodiment 1 4, 4', and except using 4"-tris [N-(3-methylphenyl)-N-phenylamino] bird phenylamine. As for this element, the luminescent property of luminescence luminosity about 160 (cd/m^2) luminous efficiency 1.2 (lm/W) was acquired on the direct-current voltage 5V.

[0106]It replaced with the compound (35) of comparative example 2 hole injection layer, and the organic EL device was created by the same method as Embodiment 94 4, 4', and except using 4"-tris [N-(3-methylphenyl)-N-phenylamino] bird phenylamine. As for this element, the luminescent property of luminescence luminosity about 560 (cd/m^2) luminous efficiency 3.3 (lm/W) was acquired on the direct-current voltage 5V.

[0107]About all the organic EL devices shown by this example, when carrying out continuation luminescence by 3 (mA/cm^2), have observed not less than 50% of luminosity of initial luminance for 10000 hours or more, but. When carrying out continuation luminescence of the element of the comparative example 1 and the comparative example 2 on the same conditions, it became 50% or less of initial luminance in both 2500 hours, and the number of the dark spots which are the portions of an element unemitted light also increased. Since the compound of this invention is a non-plane surface nature compound, as a Reason of the above result. [in the case of thin film formation] Since it has many condensation aromatic

series rings in that it is possible to form an amorphous thin film and a compound, electron hole pouring nature improves and it is mentioned that the electron hole pouring nature of an organic EL device becomes good. Since the heat resistance as a compound was also improving, it checked that the tolerance of an element was improving also to generation of heat at the time of continuation luminescence. After producing an organic EL device, it saved in the nitrogen air current, and the degradation examination with the passage of time at the time of room temperature preservation was done. [the organic EL device of this invention which uses a general formula [1], a general formula [6], or a general formula [7]] To having held the transparent and homogeneous film after 1000-hour preservation, and having had the initial characteristic before preservation, and the same initial organic EL device characteristic, [the element of the comparative examples 1 and 2] The organic layer became cloudy partially, crystallization was seen, and, also in the initial organic EL device characteristic after 1000-hour preservation, luminous efficiency and the maximum luminescence luminosity had also deteriorated [the luminescence luminosity in the direct current 5V / below half] till 30% of the first stage.

[0108]The organic EL device of this invention attains improvement in luminous efficiency and luminescence luminosity, and reinforcement.

the increase of the luminescent material used collectively, doping material, electron hole pouring material, and electronic pouring material -- admiration -- an agent -- element manufacturing methods, such as resin and electrode material, are not limited.

[Effect of the Invention]By this invention, it had the electron hole pouring capability to have excelled, and also when it saved and drove at a long period of time or high temperature, the compound which has the stable characteristic was able to be obtained. With the compound which this invention provided, it is high luminous efficiency and high-intensity, and the organic EL device with a long life at the time of preservation or a drive was able to be obtained compared with the former.

[Translation done.]